Sequential harvesting for lower alcohol wine: A sensory and chemical investigation

Rocco Longo, 1,2,3 John W. Blackman, 1,2 Guillaume Antalick, 1 Peter J. Torley, 4 Sharon Nielsen, 1 Suzy Y. Rogiers 1,3,6 and Leigh M. Schmidtke 1,2

1 National Wine and Grape Industry Centre, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, Australia,
2 School of Agriculture and Wine Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, Australia,
3 The Australian Research Council Training Centre for Innovative Wine Production, 4 School of Science, RMIT University, Melbourne, VIC 3001, Australia
4 Quantitative Consulting Unit, Research Office, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, Australia,
5 NSW Department of Primary Industries, Wagga Wagga, NSW 2678, Australia

Introduction

Over the last few decades, alcohol content in Australian wines has steadily increased by up to 2% v/v. This can negatively affect the microbiological kinetics during fermentation and lead to deleterious chemical and sensory aspects in the final wine. For these reasons, a number of methods have been implemented to moderate alcohol content. Unfortunately, these have not been proven to be sufficiently effective (viticultural practices); or to alter the wine aroma composition (membrane processes). This study was designed to quantify the effectiveness of harvesting grapes at different sugar concentrations and blending their respective wines (50:50 ratio) in order to produce more balanced but less alcoholic wines (Figure 1).

Petit Verdot grapes were harvested from a commercial vineyard located in Rylstone (Mudgee Region, New South Wales, Australia) on two occasions in 2015. The harvest dates were planned to achieve an approximate 3% v/v alcohol difference (Table 1). Grapes were harvested in triplicate and kept separate for vinification. After crushing/destemming, approximately 25% saignée (juice run-off) was practiced. Wines were made in 100 L tanks at 25 °C by sequential inoculation of yeast and LAB. Prior to bottling, 5 L of both harvest wines were blended (50:50 ratio). Sensory difference tests and descriptive analysis were performed by a trained panel (n = 13) for each treatment. Wine volatiles and total phenolics were quantified by HS/SPME-GC/MS and spectrometry respectively.

Materials and Methods

Table 1: All data are expressed as the means of the three replicates ± standard deviation (±SD). Statistical analysis: one-factor ANOVA and Tukey’s test (P < 0.05). When appropriate, comparisons were made between statistically significant differences. H1: first harvest; H2: second harvest. B: H1 × H2 (50:50) × June 24, 2015 bottling date.

Results

Table 2: Triangle test results for wines.

Wines & Judging

Table 3: Sensory descriptors of wines.

Figure 1: Sequential harvest (trilateral harvest) diagram.

Figure 2: Sensory profiles of wines (letters under the descriptors indicate a statistically significant difference at p<0.05. In the order: first harvest (H1), second harvest (H2) and blend (B)).

DA revealed that there were only minor differences between B and H2 for most aromas (Figure 2). Likewise, the blend produced a wine with no significant differences in acidity and alcohol perception, but surprisingly, astrogery was found to decrease significantly. Moreover, B was not significantly different to H2 for liking ratings. There was a marked difference between H1 and B, with a significant increase in dark fruit, plum and alcohol attributes in addition to a decrease in red fruit, tomato leaf and acidity.

Conclusions

A sequential harvesting regime achieved a moderate alcohol reduction without any substantial impact on the sensory attributes wines in comparison to the later harvested, higher alcohol wine. This approach could be utilised commercially in seasons when growing conditions are appropriate.